Abstract Submitted
for the DNP07 Meeting of
The American Physical Society

Magnetic Field Finite-Element Calculations for the SNS Neutron EDM Experiment S. BALASCUTA, R. ALARCON, Arizona State University, B. FILIPPONE, B. PLASTER, R. SCHMID, California Institute of Technology, NEDM COLLABORATION — The nEDM experiment is a new search for the electric dipole moment (EDM) of the neutron with a sensitivity of 10^{-28} *e-cm* at the recently constructed Spallation Neutron Source (SNS). The measurement requires a static magnetic field surrounding two target cells that contain superfluid ^{4}He, polarized neutrons and polarized ^{3}He atoms. The latter are used as a co-magnetometer and ultracold neutron spin precession frequency analyzer. The applied static magnetic field, B_0, is chosen to be about 10 mG resulting in a precession of the magnetic moments for both neutrons and ^{3}He nuclei of $\sim$30 Hz. To maintain the polarization of the neutrons and ^{3}He atoms, the magnetic field should be very uniform with gradients of the order of 0.1 μG/cm averaged over each cell volume. A separate requirement on the volume-averaged magnetic field gradient $<dB_x/dx>$ in the direction of B_0 of less than 0.01 μG/cm is necessary to minimize false EDM signals. In addition, to reduce the influence of ambient external fields an overall magnetic shielding factor of $\sim 10^5$ is required. We present finite-element calculation results for the complete nEDM static magnetic field configuration including magnetic field gradients and ^{3}He relaxation rates.

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Date submitted: 27 Jun 2007 Electronic form version 1.4